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Revisiting the Staff Static or Dynamic?

A Monograph
by
Major Drew N. Early
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School of Advanced Military Studies
United States Army Command and General Staff College
Fort Leavenworth, Kansas

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ABSTRACT

REVISITING THE STAFF--STATIC OR DYNAMIC? by MAJ Drew N. Early, USA, 57 pages.

This monograph examines the US Army tactical staff. Although the staff's importance to tactical success is recognized, it remains the product of evolutionary development. Rather than adapting in a proactive manner, changes in staff structure and organization continue as a result of responding to previous conditions and problems.

The monograph first provides a background of staff development. The history of the staff is analyzed, assessing the relationship between technology and the need for staff representation that could best extract leverages from technological innovations. Establishing this relationship provides insight into changing requirements for today's staff.

A doctrinal analysis examines the present role of the tactical staff. This analysis is made, considering the significant mission changes that are associated with full-dimensional operations in a force projection environment. The assessment uses lessons learned from recent experiences. Recommendations for improving problem areas are combined with technological insights that suggest modifications to the current staff.

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Introduction

"The Romans said, "If you would have peace, you must be prepared for war." And while we pray for peace, we can never forget that organization, no less than a bayonet or an aircraft carrier, is a weapon of war."

Rep. Bill Nichols¹

A vast amount of study of the art of warfare revolves around the personality and character of the commander, the nature and type of weaponry, the specific tactics used in given battles, and the consequential impacts of these aspects on subsequent history. One component of military history, however, which is seldom given serious consideration in any such study concerns the role and responsibilities of the staff.

Despite the significant allocations of resources in terms of training, personnel, and equipment that make up the staff, little forethought seems to have gone into its use and development. This lack of consideration has particular relevance in today's environment of austerity, where greater efficiencies are demanded from existing resources.

This monograph analyzes the staff and recommends adjustments to improve its organization and structure. The existing tactical staff is assessed, with a view toward maximizing its effective utilization in support of current Army operations. The monograph shows that

technology influences staff organization and structure by creating the need for certain types of staff officers. Commanders need this staff representation in order to understand and maximize the effects of technology.

The staff is a product of historical evolution. It is the result of a commander's need for some particular type of expertise that helps him exploit a certain capability, or (more commonly) to relieve him of distracting burdens. From its inception, the staff has existed to facilitate command and control processes. Additionally, it has provided the assurances that come from the collective competencies of the staff as a whole, guarding against the incompetence of any one individual.² In this manner, the presence of a staff does not necessarily guarantee a victory, but it at least serves as a form of insurance precluding a military unit from making a critical error that would lead to certain disaster.³

The present structure of the tactical staff reflects previous needs for operational support and assistance to the commander that may no longer have relevance on the battlefield. Although its current structure may satisfy existing command and control (C2) requirements, it does not necessarily follow that the existing staff structure will be most effective or

efficient in supporting current or near-term US Army operations.

This monograph focuses on the role of the staff in its support of tactical operations, with particular emphasis on the significant changes associated with full-dimensional operations'. A brief overview of the historical development of the staff is provided, along with an in-depth historical analysis of those staff modifications made by commanders as they strove to exploit the efficiencies and leverages made possible by technological advances. The effectiveness of the current US Army tactical staff structure, and its ability in supporting full-dimensional operations is discussed. The value of this study is its proactive approach to staff design, based on clues provided by historical and doctrinal analysis. The conclusion summarizes the research results and presents recommendations.

HISTORICAL OVERVIEW

"Generally, management of many is the same as management of few. It is a matter of organization."

Sun Tzu'

The actual origins of the institution of the staff are lost in time. Sun Tzu's comment points to an understanding of basic staff organizational techniques. Initial indications of a military staff date from the

period of the Egyptian Pharaoh, Thothmes (1600 B.C.), with written references to his staff surviving today.⁶ Indications of a structured staff's existence are evident throughout the achievements of many of the notable military leaders, from the time of Alexander to that of Frederick the Great.

Ancient efforts at organizing for combat revolved around attempts to set up and coordinate the use of tactical formations in a manner that would reflect their relative strengths while masking any weakness.⁷ Associated military thought began to evolve, not in a vacuum, but simultaneously with cultural and scientific progress.⁸ Initial indications of a military linkage with technology began to develop with the "...expanding use of the special arms, such as artillery"⁹ and the need for advisers to assist the commander in proper use of these new capabilities.

Logistically, the advent of staff officers as advisors on the distribution of food emerged with the armies of Gustavus Adolphus. These developments all began to reflect the growing specialization of military functions, especially those functions performed by staff officers.¹⁰

First notice of a modern, significant staff structure appeared shortly before the Napoleonic period. The effort that would eventually support

Napoleon's own natural genius had its firm roots in the works of de Bourcet¹¹ and Thiebault, and subsequently flourished under Berthier, as Napoleon's Chief of Staff.

Given the new nature and magnitude of Napoleonic armies it became vital that the staff assume a greater role. The army had expanded to such a massive size that a single individual could no longer effectively control the entire body. Recognizing the unwieldy nature of the mass army, Napoleon used de Bourcet's development of the division.¹²

Placing his forces under subordinate commanders gave Napoleon the capability to operate more efficiently, devoting his own efforts to the planning and execution of plans and operations, supported by both Berthier's staff and the Maison (Napoleon's version of a personal staff).¹³ Napoleon left the multitude of administrative tasks necessary to control the vast human resources harnessed by the levee en masse to another staff agency--Daru's administrative and economic organizations.¹⁴

As military and political observers grappled with the mystery of determining just how Napoleon was able to achieve the victories that he did, they became convinced that his supporting staff structure was one element that led to success. British, Prussian, and

even US efforts before and during the American Civil War all reflected the influences of the Napoleonic army, to include elements of his staffing procedures. This particular avenue of investigation would reach its fullest extension under the Prussians, with the advent of their Generalstab (or General Staff, in English--a corruption of the German phrase which originally merely referred to all personnel under the general's command¹⁵ and would later evolve into its current meaning).

In the late nineteenth century, Prussian successes against Austria, Denmark and France had set the stage for both imitation and experimentation in staff development by the French, and to a lesser degree, the British.¹⁶ By the time of the American Expeditionary Force's (AEF) arrival in France during WWI, General Pershing had begun a close study of prevailing staff systems.¹⁷ Recognizing the benefits of the staff as embodied by the Allies, he established by an AEF General Order, on February 16, 1918, the basics of today's familiar tactical staff structure of G-1 through G-5¹⁸. (G-1 represents the staff section that performs personnel and administrative functions, the G-2 section is concerned with intelligence/counter-intelligence and security, the G-3 section is concerned with operations, the G-4 section is concerned with

logistics, and the G-5 section was originally concerned with training. The training function would later move to the G-3's scope of operations and the G-5 would ultimately focus on civil-military matters.)

The Napoleonic influence persists today, as many of the concepts of the staff described by Thiebault persist in US staff principles.¹⁹ Certainly, the initial staff structure of 1918 has changed to some degree. Yet, the evolutionary process continues, addressing the deficiencies of existing staff organizations only as the need becomes apparent.

HISTORICAL ANALYSIS

"The art of war--as it is certainly the noblest of all arts so in the progress of improvement it necessarily becomes one of the most complicated among them... in order to carry it out to perfection, it is necessary that it become the sole or principal occupation of a particular class of citizens."

Adam Smith²⁰

Until the time of the Industrial Revolution, warfare remained a fairly static institution. The decisive factor in battle was the commander's ability to combine all the aspects of a particular fighting force, (whether hardware, training, doctrine, or organization) into a decisive whole.²¹

The advent of technology began a rapid series of changes to the face of warfare. Its application in

military operations, especially in fortress warfare, dictated changes in emphasis for the staff. If a commander truly wanted to take advantage of any potential leverages afforded by the application of a new technology, a technically competent staff was a necessity.²²

Not until the nineteenth century, however, would the true impact of technology begin to be felt on military operations. Some of this impact would be felt in other than traditional military terms of new weapons with greater power or extended ranges. Technologies associated with roads, vehicles, communications, and timekeeping also went a long way toward dictating the character of military operations.²³

Although indications of significant impacts of technology on existing staffing needs had begun to appear, traditional staff models associated with the Napoleonic example remained relatively unchanged. Ironically, this inattention to the staff took place at precisely the time that the Industrial Revolution spawned major technological advances that would greatly affect the conduct of warfare.²⁴ The advances of the telegraph, railroad, and steam engine (as motive power for the railroad and shipping) presented important opportunities for change to the conduct of war.²⁵

Still, there was not a complete hiatus in staff

development for the US Army at this time. The direct influence of non-military technological advances on military staffing was first evidenced in John C. Calhoun's creation of the Subsistence Department during his tenure as Secretary of War (1817-1825).²⁶ Calhoun used the staff, with its technical expertise, to advise him on military implications of new food preservation techniques.

Initial recognition for a need for staff expertise in new technological areas came from Prussia. The railroad, with its own source of motive power, represented the greatest revolution in land mobility since the advent of the wheel.²⁷ For the first time, an army could direct its entire strength into an enemy's country.²⁸ The Prussians, quick to recognize this fact and noting Benedek's accomplishments in mass movements of Austrian troops, established a railway section in 1859,²⁹ and added an expert on railways, Count von Wartenstein, to the staff.³⁰ The sophistication of the Germans in this respect is noteworthy, recognizing and satisfying a need for staff expertise in railroads two years prior to the American Civil War.³¹

The Germans' quick appreciation of the capabilities offered by exploiting the new-found mobility of railroads would reap benefits just seven

years later, during the Koeniggraetz campaign.

Ironically, the country that had been impressed by Austrian uses of the railroad would now overtake their Austrian adversaries in use of this new capability.

"The side that emerged victorious was the side whose army had used five railways to deploy (as against only one used by its opponent)."²²

This victory did not come without significant effort. The details of maximizing this new capability and coordinating movements of men, supplies, weapons, and trains demanded a level of exacting staff work requiring significant accuracy over previous, ad hoc attempts."²³

A need for staffs capable of exhibiting a level of technological sophistication had emerged. German interest in new technical developments would continue, witnessed by a dramatic increase in the numbers of technical specialists on their staffs."²⁴

As the US moved into the Civil War, both Union and Confederate staff inadequacies became readily apparent. The Napoleonic staff model used by both sides initially in the conflict was not up to the challenges of the extended lines of large Civil War Armies."²⁵

Commanders were confronted with the need to develop an adequate staff system that could handle the new-found mobility of mass armies moving across multiple,

extended lines of operation."⁶ In fact, some commanders, (notably Lee), would never find an adequate staff model that could meet the rapidly changing needs of technology."⁷ Technology's impact had begun to influence staffing requirements.

Among the first to comprehend this during the Civil War was McClellan. With a recent background in railroads (chief engineer of the Illinois and Central Railroad in 1857, then president of the Ohio and Mississippi Railroad in 1860),⁸ he appreciated the strategic potential of railroads."⁹ The challenge was to harness that potential.

Railroads typified the Industrial Revolution, moving warfare into an ever-more complex realm. A natural response to this complexity was to turn to the mechanism of the staff. It could provide for better control of any capability afforded by technology."¹⁰ In conjunction with Montgomery Meigs McClellan established staff responsibilities for rail operations, placing that area within the purview of the Quartermaster Department."¹¹

This action heralded an equally significant development--modern logistical staff procedures that reflected the emerging importance of logistics, especially in the areas of supply and transport. Mass armies that were armed and delivered to the

battlefield by the fruits of the Industrial Revolution were of little value if those armies could not be sustained.

This hard fact was quickly driven home to McClellan. During the Peninsular Campaign, ad hoc logistical planning lost him almost half of his supplies. McClellan had formally designated a Quartermaster for his army; Rufus Ingalls was charged with responsibilities for establishing a provisional supply system.⁴² Ingalls adroitly responded to the mistakes in planning--being the first to establish the concept of an order of march for resupply columns along with an associated staff system to make it work.⁴³

Sherman, too, recognized that the expanded capability for movement and deployment of his forces mandated an increasingly sophisticated logistical staff structure. He appointed L. L. Easton as a staff officer for logistics with full authority for coordinating the supply system and linking it with operational planning. This represented a important step toward a modern staff organization.⁴⁴ Sherman appreciated the expanded opportunities that railroads offered him, allowing him to project and coordinate the movement of forces over greater distances in less time. He also understood the significant role that this new capability provided his supply system. In an

innovative manner, Sherman took his railhead into the field, never letting it lag more than four days behind his army.⁶⁵

Overall, Union efforts to master the technological challenges presented to logistics moved from initial theory to practice. In this particular area, the development of a modern staff system was especially evident.⁶⁶ From a logistical perspective, staff development was strongly influenced by the advent of new technology.

Another significant, new technological influence of the period was in the area of communications. Among initial organizational problems of Civil War forces was their underdeveloped and experimental state of military communications.⁶⁷ Improved communication procedures would benefit C2 across all functional areas. Telegraphic capabilities developed in response to the demands for controlling actions across the Civil War battlefields.⁶⁸ Ancillary civil interests in communications also supported improvements in this area, but the primary driver behind Civil War communications development remained the need for enhanced tactical and strategic coordination.⁶⁹

McClellan was among the first to recognize the need for technically literate staff personnel who could master this new technology. He established positions

for staff signal officers in the Army of the Potomac, and then, after succeeding Winfield Scott, he did the same for the US Army.²⁰ Other generals also began to appreciate the potential of the telegraph.²¹

The use of this new technology dramatically changed warfare, particularly by its support to C2 mechanisms. Union success at Chattanooga resulted from both good tactical communications and improved staff procedures.²² This innovation did require staff understanding and representation (in terms of a staff signal officer) in order to make best use of it, but the dividends, in terms of enhanced control, not only assisted the commander but also dramatically enhanced the effectiveness of all staff elements.

Linkages between staff developments and advances in technology were not limited to the American experience. In 1863, changes to the existing Russian staff system began.²³ As Russian technological development was less advanced than that of its contemporaries, the pace of change was not as swift, yet was still noticeable to outside observers. Notably, technology enhanced the role of the staff specialist²⁴, both in the Russian Main (General) staff as well as with troop staffs. This trend continued. As a direct result, technology became one of the most dominant influences on Russian military development

throughout the era prior to the First World War", emphasizing the need for a staff that was expanded in both scope and authority.

Still, the preeminent staff organization of the period would be found in the Prussian version. Continuing to learn and refine the lessons of its wars with Denmark, Austria, and France, the Prussians had the first staff trained to meet the growing complexity, size, and technology of military organizations of the latter half of the nineteenth century." They continued their established practices of staff rides, formal schooling, and alternating line with staff assignments, still keeping abreast of technological innovations.

As the century drew to a close, the US Army was eager to exploit the capabilities offered by new technological developments, supporting the precepts of mass, combined arms employment, and unity of command." It was only through the application of technology that commanders could begin to meet these precepts.

Still, as anxious as the Army may have been to exploit any technological leverage, it is important to emphasize the point that commanders were not interested in technology for its own sake. Instead, they were interested in what the effective application and use of

that technology could do for them," either in terms of new capabilities or expanded existing ones.

By the end of the nineteenth century, technological change had introduced enormous complexities to warfare. With Marconi's invention of the radio, improved communication abilities (radio and telegraph) were coupled with an evolving staff system that was trying to become more effective. These joint efforts at improving C2 on the battlefield (through improved communications and staff procedures) would go a long way to regain some measure of control, in the face of new battlefield complexities."

The following dilemma developed: the same Industrial Revolution that produced mechanisms capable of assisting the commander in controlling his forces, also made possible the mass armies that taxed the existing control structures in a manner never previously visualized. Without the staff as a control mechanism, the mass armies of pre-World War One would have been unmanageable."

As events moved toward the First World War, inventions from the civil sector had begun to develop certain military applications. Ultimately, the presence of each of these technologically-based innovations would be represented by special staff officers who understood the new technologies and were

able to assist the commander in their particular application(s).

The experience of the First World War exposed Twentieth Century armies to a number of technically-driven changes on the battlefield.²¹ Among the Great War's significant changes were the use of chemical weapons, radio, the airplane, and the internal combustion engine.

The origins of the Chemical Corps and the attendant need for chemical staff officers to advise the commander on the complexities of chemical warfare has firm roots in this era. (In fact, it was the initial Allied blockade strategy that caused German chemists to turn to the synthesis of otherwise unobtainable chemical compounds and ultimately explore the use of noxious chemicals as potential technological levers for Germany).²² The rich traditions of Army Aviation, with its attendant staffing requirements, also date from this time.

The overall explosion of all of the Technical Services (Engineer, Motor Transportation, Quartermaster, Medical Service, Ordnance, and Signal) within the US Army was especially striking. Upon US entry into the war, the technical branches comprised approximately one tenth of the total Army strength, yet by the close of the war (less than 21 months later),

the technical services constituted approximately one third of the Army's total peak strength, exclusive of trainees." Concurrent with the growth of these technically-oriented branches was their representation on the new AEF staff model established by an AEF order on 16 February, 1918," and applied down to divisional level.

One particular WWI innovation is often overshadowed by the glamour or fear of the plane, tank, poison gas, or radio. Yet, it bears special emphasis--the impact of the internal combustion engine used in ground transport. Some indications of its relative importance have already been alluded to in reference to the rapid growth of the American technical branches. The application of this specific technology did not go unnoticed by others.

The Germans were quick to gain an appreciation for the relative merits of trucks in mass movements of troops. In 1917, they created a transportation section within the staff (in addition to their existing railway section), and assigned a staff signal officer from Fourth German Army Headquarters" to this newly created post. Some significance should be attached to this action; not only was the need for a staff motor transportation officer recognized under wartime conditions, but it was then filled by a capable young

signal officer who would later become famous for his grasp of armored warfare--Heinz Guderian!"

By war's end, the need for staff officers with a technical grasp of new military capabilities matched the emergence and applications of new technologies. Integrative effects on command and control of field wire, radio, and aviation expanded the scope of military operations. Associated with this growth was the inevitable increase in complexity, "... making staffs more necessary and synchronization of functions more important."⁷ Facts continued to indicate a linkage between technology and the need for staff representation of that technology in order for any new capability to be fully exploited.

In the post World War II era, the need for technologically-competent staff officers would be accelerated. In large part, this was due to a continuing belief that, for America, technical solutions could be found for most military problems." During this period, US strengths were perceived as a function of technological achievements and Americans wanted defense policies that played to those strengths, rather than placing manpower at risk." The growing sophistication and ever-increasing complexities of warfare was recognized and accepted by the US Army in its acknowledgement in the Field Service Regulation

that victory in modern war was dependent on troops and commanders mastering complex skills, which were mainly technical in nature.⁷⁰

The rate of technological innovations introduced to the Army was unparalleled in any peacetime environment.⁷¹ Fueled by the threat of Communism, a very substantial research and development effort⁷² sought to maintain (and increase) US leads in technology.⁷³ Systems were introduced, then subsequently replaced by even newer systems, as the Army sought to exploit the advantages offered by the application of physics, electronics, and automation.

This period marked the occurrence of a revolution in the technological complexity of warfare.⁷⁴ The nation witnessed the emergence of the technical specialists--those who had the requisite skills, knowledge, and ability to effectively utilize complex systems. These systems were initially associated with the fields of navigation and fire control, then expanded into related areas of missile guidance, nuclear weapons, electronic countermeasures, teletype and cryptographic applications, and automated data processing support.⁷⁵

Concurrent with the emergence of these new, complex systems was the need for special staff officers. These individuals could competently advise

the commander on how to orchestrate new technological capabilities into effects that best supported the commander's intent.

The criticality for technically skilled and well-versed staff officers quickly became apparent. It was strikingly demonstrated in a post-exercise observation written by an Army physician after Exercise Desert Rock VI (involving the positioning and maneuver of a composite armored force, Task Force Razor, in the vicinity of a 30-kiloton atomic detonation).⁶ He indicated that "... even victims of a 700-rad dose would not require 'any significant attention' for at least a week after exposure."⁷

Contrast the Army physician's conclusion with the actual case history of a physicist at the Los Alamos National Laboratory who was accidentally irradiated in 21 May, 1946. The physicist received at least 590 roentgens of radiation during an accident associated with an experiment and died nine days later.⁸ Current US Army planning factors indicate that doses of 650 rads will affect 100% of personnel within two hours, requiring hospitalization, and with fatalities in excess of fifty per cent expected within sixteen days.⁹ (Note: a rad is a measure of absorbed energy; a roentgen is a measure of released energy. In this case, the two measures of radiation are roughly

equivalent). This example graphically illustrates the need for technologically-competent staff officers who can both facilitate the C2 process and prevent errors resulting from ignorance or over-enthusiasm on the part of commanders or other staff members.

The historical analysis indicates that a definite linkage exists between technology and associated staff officer requirements. This linkage becomes even more discernible as warfare becomes more complex. In order to achieve the decisive advantages afforded by new technological capabilities, a commander must have staff officers who understand the new technology and its best application in a military environment.

ANALYSIS OF CURRENT STAFF STRUCTURE

"Your staff won't win the war for you, but it can prevent you from winning."

LTG John E. Miller²⁰

Today's commander makes use of many different kinds of specialized assistance,²¹ but the staff remains one of his key tools. The commander needs control over his organization, and the staff supports this control function. This function has become even more complex due to political uncertainties and changes in traditional missions. The staff's mission remains in support of the commander²², and its organizational importance is recognized.²³

Changes in traditional tactical mission focus, reinforced with the prospects of increasingly sophisticated technologies, mark the near term environment as more complex in nature." Factors causing uncertainty include potential political instability and new roles and missions for the US Army that are associated with full-dimensional operations. This increase in diversity and complexity makes it even more important, yet difficult, for an organization to coordinate and predict the behavior of each and every one of its component parts." The need for an enhanced control capability for military organizations has developed.

The necessity of a staff for the efficient operation of any organization is an important element of control." It is this aspect of control that is of interest to the commander. He seeks control in order to eliminate, whenever possible, the risks of uncertainty." Still, control only remains an adjunct to command, itself," functioning as a support mechanism." Staff officers assist the commander in this control function, with special staff officers advising the commander in professional and technical areas."

The battle staff's purpose is to assist the commander in making and executing timely tactical

decisions." This emphasis on supporting the commander and implementing his will is a dominant theme in current and emerging doctrine for US Army staff operations." Because the staff's influence is felt at every level, it offers some of the greatest potential payoffs for reducing complexity" and extracting greater efficiencies from existing resources. Adjustments in the staff remain this paper's focus for improving control and reducing uncertainty.

The influences of technology and its assimilation have been historical agents of change for the staff. Other catalysts for change lie in significant shifts in doctrinal employment of forces.

Future trends of technology on requirements for certain types of staff officers are not totally clear, but some significant clues do exist. Technological advances continue to affect the modern battlefield." The transformation of technological capabilities into relevant military applications continues to be an important area for staffing support." The ramifications of technology's growth compels a continued, associated increase in the availability of skilled, qualified people necessary to master it."

One of the values of the staff is that it offers a convenient vehicle to inject the benefits of technology

into an organization." The staff plays a key role in introducing technology into organizations," and it is the potential advantages offered by the exploitation of technology that remains of interest to the military."

This implies a need for an element of adaptability to exist within a military unit. A requirement for military organizations to be capable of change does exist, since neither human affairs or technology remain static.¹⁰⁰ The consequences for organizations failing to respond to changed political or technological environments are dramatic.¹⁰¹ The staff continues to be a convenient vehicle for introducing change into a military unit.

One significant area of technological change revolves around the management of information. Trends continue to indicate a greater requirement for the commander to exhibit enhanced rapid decision-making, due to the expansion in complexity and depth of operations. Subsequent staff requirements to synchronize these greater efforts are also increased.¹⁰²

The realm of synchronization has one major thread that is common to all activities--the necessity for information. An entire area of study has emerged that deals with the controlled manipulation of information. Some of the greatest enhancements from technology may

lie in the area of knowledge engineering¹⁰³, also known as information engineering. However, controlling the flow of information is only one portion of overall technological influences on information.

The accurate retention of information, and subsequent relay of critical information, even after the departure of resident expertise, is now possible.¹⁰⁴ The systems that provide this capability are formally known as expert systems. Expert systems are automated decision support aids that capture the transient expertise of resident experts and allow that knowledge to be passed along to others. The emergence of information management technology suggests that a new staff officer skilled in information engineering techniques and expert systems can offer significant potential to a commander.

As this technological proliferation has expanded the potential capabilities and effectiveness of the military, it has given the military an increased capability for involvement in an uncertain and diverse range of missions, with subsequent heightened needs for coordination and control.¹⁰⁵ The mission requirements associated with a force projection policy, instead of forward presence, increase the complexities faced by a modern commander. These developments force an adaptation to the manner and conduct of conventional

military operations.¹⁰⁶

Drastic changes in international and domestic political systems have altered the very context in which the application of military force is now contemplated.¹⁰⁷ The scope of US military efforts encompasses nontraditional missions¹⁰⁸ as well as the new requirements for full-dimensional operations. FM 100-5 recognizes this significant shift, and the need for an Army commander to apply "... all means available to him in order to accomplish any given mission, decisively and at the least cost, across the full range of possible operations."¹⁰⁹ There is an inherent tension between the competing components of decisiveness and efficiency; the mechanism of the staff can mitigate this tension.

This shift in perspective brings a corresponding change to traditional views of military force. In particular, two elements of military operations, the development and deployment of forces, have attained new importance. These two areas are key to the determination of success or failure for any actual operation involving deployments.¹¹⁰

Within the focus of supporting force-projection or full dimensional operations, the impact of logistics has taken on greater meaning. Logistics is a significant part of any operation involving the

development or deployment of forces. Because logistics plays such a key role in full-dimensional operations, doctrinal analysis of the staff reflects the staff's ability to facilitate logistics, as well as C2.

The successes of recent US Army operations are notable. Still, there are always things that could have been done better and the Center for Army Lessons Learned (CALL) has captured many of these lessons. Some of the lessons were learned during the actual conduct of operations; others resulted from concentrated efforts to determine the causes of common problems seen during training events at the Combat Training Centers.

CALL observations are supplemented by remarks from other agencies that comment on weaknesses in the current staff structure, ranging from official governmental reports to individually recorded observations. These observations as a whole indicate deficiencies in the areas of staff transportation expertise, civil affairs capability, liaison officer availability, Reserve Component support for critical skills, and the overall conduct of continuous operations.

A significant component of full-dimensional operations involves deployment. This has placed a greater stress on organic unit movement planning

capabilities as well as the traditional structure of the Division and Corps Transportation Offices (DTO and CTO, respectively).

Increased deployment requirements for all tactical units mandate an understanding of unit movement procedures. Unit movements continue to occur at the battalion task force and brigade level, yet the functional expertise to carry out these operations formally exists only at the division level. Significant assistance to deploying units from installation support activities only masks the problem, particularly when units must then prepare for redeployment.

CALL has noted this situation, commenting that some expertise needs to exist at the deployable unit level. Unit Movement Officers (UMOs) can receive formal training through the Joint Strategic Deployment Training Center at FT Eustis, VA and assist in this area.¹¹¹ CALL makes a recommendation for Unit Movement Specialists (Military Occupational Specialty (MOS): 88N) to be on deploying staffs and assist in both the planning and execution of unit moves in order to ensure organizational readiness for force projection requirements.¹¹²

Associated staffing analysis of the CTO and DTO indicates that an increasing need for transportation

expertise has developed. Currently understaffed, these offices range in size from two each personnel within a CTO¹¹³ and two to five personnel within the DTO.¹¹⁴ One theme for further analysis concerns the impact of these slim margins of staffing on the ability of these offices to conduct continuous round-the-clock operations.¹¹⁵

Adjustments to these noted staffing problems would facilitate logistics. An organic staff understanding of transportation procedures would certainly enhance a battalion or brigade task force in its ability to anticipate in support of force projection operations. This type of facility would also allow for better synchronization of unit efforts with existing transportation assets, to include higher-level planners. A more robust transportation staff capability at division or corps would support the concept of continuity, with someone always available to handle emerging issues.

This capability would also enhance the responsiveness of the existing transportation apparatus, particularly if deploying units were made more aware of sensitivities within the transportation structure--such as not deploying with uploaded weapon systems and causing surface watercraft to ground themselves out on loading berths due to vehicles being

uploaded with basic loads. In this particular case involving the 24th Infantry Division, units had not updated previous deployment data.¹¹⁶ The additional unprogrammed weight of basic loads caused the ship to settle into the harbor's silt, and delayed loading operations until the advent of hightide refloated the ship, with some equipment then subsequently offloaded. Resident staff expertise in transportation matters on the part of the deploying units could have avoided this problem. The totality of the assessment in this area suggests that significant benefit could derive from a resident transportation capability imbedded in deployable battalion and brigade staffs, along with that augmentation necessary to allow divisional and corps-level transportation offices to conduct continuous operations.

The next area that needs staffing adjustments is in Civil Affairs and civil-military operations (CMO). This area is particularly important because international law establishes provisions for victorious powers (even liberating forces¹¹⁷) to execute certain responsibilities for basic safety and security toward the people of the area of operations.¹¹⁸ To do otherwise really makes the use of military force within that specific area politically problematic.¹¹⁹

Despite the importance of civil affairs and CMO,

particularly on the longterm impacts of military operations, considerations involving this area remain very weak. The focus on CMO remains very short term and after-the-fact.¹²⁰ Yet political concerns and civil problems must be part of the "stock-in trade" of staff officers.¹²¹ This lack of interest in civil affairs was noted in recent experiences¹²², dating back to Korea.¹²³ It has also been noted in US doctrine, particularly identifying the need for a civil affairs officer at brigade and battalion level (the level of unit execution for Operation JUST CAUSE). The need for civil affairs personnel exists at this level to ensure liaison with the local populace.¹²⁴ Later on, the requirement for an increased liaison capability will resurface.

Changes in the staffing of civil affairs personnel can also facilitate logistics. Consider the key support that these officers can provide in interface with host nation representatives, in order to get host nation assistance, routing information, and advance determination of any special requirements. The use, up front, of civil affairs could provide especially valuable information on relative operational conditions and needs within the area of operations. Key benefits arising from aggressive civil affairs employment would then follow in determining any additional, unprogrammed

local support requirements as well as augmenting US needs with local capabilities.

The civil affairs asset is found, for the most part, in the Reserve Components (RC), which presents special challenges of availability and development of working relationships with Active Component (AC) counterparts on a day-to-day basis. Problems exist with the dependence on the RC to meet staffing requirements for short-notice operations. Recent deployment experiences indicate that commanders have only a forty eight to seventy two hour window of opportunity to make deployment decisions in a crisis action planning mode.¹²⁵ Yet, the mobilization pattern of the RC does not support the swift activation of key personnel.

The slow responsiveness of activation of RC staff organizations carries over into another area that affects logistics, that of the Rear Area Operations Center (RAOC). RAOCs provide C2 to the rear and coordinate overall protection efforts aimed at maintaining the continuity of logistics functions. Yet these C2 organizations are all Reserve Component¹²⁶; so, many unit organizations make up this absence in the short term by out-of-hide adjustments¹²⁷ from existing staff and subordinate units (typically the Provost Marshal Office, G-2, G-4, and Division Support

Command)¹²⁸. This situation aggravates any existing staffing shortages that already existed within these offices.

A continuous need for liaison officers (LNOs) emerged in the research process, but is best summed up by "the number of liaison officers assigned to tactical units is insufficient."¹²⁹ This comment takes on new emphasis due to increased interoperability requirements associated with allied¹³⁰ and combined/coalition operations.¹³¹ For some time, the US has recognized the need for LNOs during exchanges within NATO¹³². A significant element of success is associated with the use of LNOs in multinational operations.¹³³

Requirements for additional LNO capability are most pronounced at the divisional level¹³⁴, but also apply to other deploying tactical formations¹³⁵. The use of LNOs would especially enhance integration and synchronization.

The need for continuous operations and synchronization¹³⁶ mandates that the staff conduct around-the-clock operations. Yet, actual resourcing of the manning levels required to support twenty four hour operations has not occurred. This shortfall is especially prevalent when a liaison function within a staff section has been recognized as necessary, yet the capability of that liaison element is not robust enough

for continuous operations.¹³⁷

The logistical elements associated with a command and control function have been especially taxed. Staffing of the forward support battalion is inadequate for it to accomplish its normal battalion C2 functions and also serve as a rear battle headquarters.¹³⁸ Consider the combined effects of this inadequacy and associate it with the previously mentioned lack of a RAOC--it only makes the problem worse! This shortfall is not supported by logistical staff assistance from the maneuver brigades, either. The typical brigade S-4 section is authorized four personnel. This does not provide for an adequate staff presence at both the brigade Tactical Operations Center (TOC) and the Administrative/Logistics Operation Center.¹³⁹ Another emerging phenomena involves split-based logistics. The use of split-based logistics has many positive consequences, but it also mandates a need for a parallel staff structure at each node of operation. The use of split-based logistics requires both a forward-deployed and a rear logistics operations center while the organizations that perform these functions do not have the requisite staffing to man both nodes.¹⁴⁰ Instead, personnel are taken out-of-hide in order to resource both of these centers.

Clearly, makeshift arrangements such as the out-

of-hide manning of ad hoc logistics command and control nodes do not serve to enhance logistics. Instead, if split-based logistics operations are envisioned, it is only sensible to staff them at a sufficient level to support their operation at each node of control.

An additional lesson learned is in partial remediation. The US Army has recognized the utility of a qualified contracting officer to be a key part of deploying operations. Previously, these functions were done by the garrison staff. After the Desert Shield experience, the real value of having organic division level contracting officers was recognized and is now being acted on. Still, the need for procurement specialists, especially as advance party members¹⁴¹, exists for lower level tactical formations. This is particularly relevant if these formations deploy separate from higher headquarters. The presence of procurement specialists facilitates improvisation and the innovative use of unusual sources in the operational area. This also supports an ability to supplement existing sources for supplies and services on short notice, enhancing responsiveness.

RECOMMENDATIONS

The historical analysis has demonstrated that technology plays a role in influencing the requirements

for staff officers. Historically, a commander has derived the greatest advantage from a technological innovation if he had appropriate staff representation that could advise him on the best use of that particular technology. Basic staffing needs have exhibited modifications over time, reflecting commanders' recognition of a need for technological expertise within the staff. Emerging developments in information engineering and expert systems indicate that a resident staff capability in each of these fields is in order.

Doctrinal analysis and review of lessons learned coupled with an examination of the requirements associated with force projection and full-dimensional operations, indicates that a shift in mission emphasis has occurred. As the tasks associated with deployability and operations other than war emerge in importance, an examination of the staff structure used to accomplish those tasks indicates that some adjustments are in order. These adjustments reflect the growing importance of logistical functions at the level of execution.

The need for transportation expertise within the staff continues at all levels. The division transportation office should increase in size to reflect an ability to conduct continuous, twenty four

hour operations. This increase may include additional transportation specialists (MOS 88N) that could establish habitual supporting relationships with brigade and/or battalion staffs and augment those staffs during deployment. All deployable battalion or brigade level staffs should have at least one member formally trained as a Unit Movement Officer. This individual could then be assisted in technical matters by the transportation specialist that habitually supports that unit from the division staff.

A strong, imbedded civil affairs capability is a necessity for the commander. Recognition of this requirement precludes a short-term focus to military operations and would especially benefit those units involved in operation other than war.

The Army cannot continue to rely on the Reserve Components (RC) as a panacea for realworld constraints of personnel. The short term nature of present operations precludes the effective integration and use of RC personnel in supporting unit deployments. If a requirement truly exists for particular expertise in a specific area, such as civil affairs, it then needs to be appropriately resourced. This carries over to other traditionally RC-supplied activities that now have a greater utility, such as RAOCS.

Continued assessment for the likelihood of joint,

combined, and coalition operations indicates that an increased liaison officer capability has merit. This requirement, along with the realworld need for a staff that can support continuous, twenty four hour operations, implies a robustness and depth previously not seen in traditional staff organizations.

CONCLUSION

"A good staff has the advantage of being more lasting than the genius of a single man."

Jomini¹⁴²

Commanders continue to grapple with uncertainty. The staff is one device used by the commander to assist in his continual struggle to discern reality from the confusion and chaos of events. The emergence of more diverse issues and challenges concerning the use of military force will increase in the post-Cold War environment.¹⁴³ In the midst of significant change, it becomes especially important to limit ambiguity. The staff can assist in clarifying uncertain and unclear situations.

History demonstrates that there is a linkage between the introduction and application of technology and the use of resident staff expertise to advise a commander on how to best use that technology. This premise was borne by the historical analysis.

As the Army wrestles with change, it is

increasingly important to modify the existing staff structure in order to assist the commander in mission accomplishment. A review of the current tactical staff and the shift to a force-projection army suggests a need for staff modifications. Emerging technology also influences these adjustments. These changes would enhance the staff's ability to address the commander's needs.

The US continues to look to technology to provide a theoretical leverage against a quantitative advantage of any opponent.¹⁴⁴ Noting that technology is not an end in itself, the fleeting advantages posed by one particular force possessing a technology remain fairly temporary in nature, and are best used when the limits of that technology are fully understood.¹⁴⁵ The use of staff officers who understand and can apply technology to a commander's advantage are essential to success in combined operations.

Just as technology offers a clue as to staffing needs for the commanders, so too does the shift in the Army's focus. Moving from a forward-based strategy that focused on the concerns of a bi-polar world, emerging army missions and tasks now encompass the realities of an expanded and evermore complex operation environment.

The emerging significance of tasks associated with

force deployment, force development, coupled with recent experiences in both combat operations and in operations other than war leads to concerns about the adequacy of the existing staff structure. This is particularly important in relation to the staff's ability to facilitate logistics, which has taken on new importance. In view of increasingly varied mission requirements, an examination of lessons learned indicates a need for staffing adjustments, particularly in the areas of transportation expertise, civil affairs capability, liaison capability, and a more robust logistical staff structure at the tactical level.

US Army forces are expected to exhibit the attributes of flexibility and agility throughout the range of full-dimensional operations. They are done a disservice when changes in the military and political operating environments are not recognized. This includes the necessity to provide them with an efficient staff structure that supports their needs.

1. C. Kenneth Allard, Command, Control, and the Common Defense (New Haven: Yale University Press, 1990), preface.
2. Weigley, Russell F., The American Way of War (Bloomington: Indiana University Press, 1977), 200.
3. Anthony Zinni, Jack Ellertson and Bob Allardice, "Scrapping the Napoleonic Staff Model," Military Review vol. 72, number 7 (June 1992), 83.
4. U.S. Army, FM 100-5, Operations (Washington: Department of the Army), Glossary 4.
5. Sun Tzu from Art of War as cited in Tucker, Christopher, "US Army Command and Control at the Operational Level" (Monograph, School of Advanced Military Studies, Academic Year 91-92), 5.
6. Hittle, 15.
7. Martin van Creveld, Technology and War (New York: The Free Press, 1991), 17.
8. Hittle, 11.
9. Hittle, 37.
10. Hittle, 41.
11. Robert S. Quimby, Background of Napoleonic Warfare (New York: AMS Press, 1979), 176. De Bourcet's role is especially significant in his functioning as director of the first documented staff school established at Grenoble, France. Other schools existed during this period which supported the training of staff officers a part of an overall military curriculum, but de Bourcet's school was the first military institution on record that was dedicated to staff instruction.
12. Quimby, 176.
13. Hittle, 106.
14. Clarence Taylor, "US Army Staffs--Are They Broken?" (SAMS Monograph, US Army Command and General Staff College, Academic Year 91-92), 8.
15. Alvin Brown, The Armor of Organization (New York: Hibbert Printing, 1953), 40-41.
16. Brown, 47.
17. Allard, 85.

18. Hittle, 211.
19. Hittle, p.102.
20. Adam Smith, Wealth of Nations, as cited in Harold Wool, The Military Specialist (Baltimore: Johns Hopkins Press, 1968), 9.
21. van Creveld, Technology and War, 97.
22. van Creveld, Technology and War, 107.
23. van Creveld, Technology and War, 311.
24. Allard, 50.
25. Allard, 52.
26. Allard, 33.
27. Larry Addington, The Patterns of War Since the Eighteenth Century (Bloomington: Indiana University Press, 1984), 44.
28. Theodore Ropp, War in the Modern World (New York: Macmillan, 1962), 161.
29. Gordon A. Craig, "Command and Staff Problems in the Austrian Army" in Theory and Practice of War, ed. Michael Howard (Bloomington, Indiana University Press), 63.
30. van Creveld, Technology and War, 158.
31. Trevor N. Dupuy, A Genius for War: The German General Army and General Staff 1807-1945 (Englewood Cliffs, NJ: Prentice-Hall, 1977), 65.
32. Martin van Creveld, Command in War (Cambridge, MA: Harvard University Press, 1988), 106.
33. van Creveld, Command in War, 106.
34. Walter Goerlitz, History of the German General Staff (New York: Frederick Praeger, 1967), 68.
35. Edward Hagerman, The American Civil War (Bloomington: Indiana University Press, 1988), 23.
36. Hagerman, xvi (preface).
37. Gary B. Griffin. The Directed Telescope: A Traditional Element of Effective Command (FT Leavenworth KS, Combat Studies Institute, 1991), 12.

38. Trevor N. Dupuy, Curt Johnson, and David Bongard, Harper Encyclopedia of Military Biography (New York: Harper Collins, 1992), 464-5.

39. Hagerman, 35.

40. Hittle, 152.

41. Hagerman, 63.

42. Hagerman, 51. This marks a significant shift away from the traditional views held by the Prussians of the duties of a "Quartermaster". In the Prussian army, the Quartermaster functioned as the lead staff officer or as a Chief of Staff, dating back to the quartermaster's origins of acting as an advance party for the main body.

43. Hagerman, 51. As a starting point for the science of military movements, it is perhaps surprising just how far along convoy operations have developed since Ingalls' time with such refinements as block times, serials, march units, and pass times.

44. Hagerman, 282.

45. Hagerman, 280. Again, another example of what would seem to be, at first glance, a simple action yet truly innovative for its time.

46. Hagerman, 79.

47. Hagerman, 40.

48. Hagerman, 23.

49. Hagerman, 40.

50. Hagerman, 41.

51. Hagerman, 82.

52. Hagerman, 223.

53. Bruce Menning, Bayonets Before Bullets (Bloomington, Indiana University Press, 1992), 16.

54. Menning, 2.

55. Menning, 2.

56. Peter J. Schifferle, "The Prussia and American General Staffs: An Analysis of Cross-cultural Imitation, Innovation, and Adaptation" (MA Thesis, University of North Carolina, 1981), 8.

LTC Schifferle's mastery of the historical background and role of the staff in the evolution of Western command and control structures is noteworthy. His background of knowledge in this area is complemented by his ongoing discussions with Mr. Jack Burkett, (Senior Analyst on Command and Control for the BDM Corporation) on the future of Army tactical C2.

57. Allard, 56.

58. Roger J. Spiller, interview by author, notes, FT Leavenworth, KS, 23 Aug 93. DR Spiller has commented on the paucity of material written on the historical development of the military staff in comparison to other military areas.

59. Allard, 47.

60. Hew Strachan, European Armies and the Conduct of War (Winchester, MA: Allen and Unwin, 1985), 128.

61. Christopher Tucker, "US Army Command and Control at the Operational Level" (SAMS Monograph, US Army Command and General Staff College, Academic Year 91-92), 10.

62. Addington, 133. Addington's references to Allied underestimation of German abilities to last out a blockade refers to foodstuffs. However, it was the preeminent German aniline (artificial) dye capability, led by noted chemist Fritz Haber, that was refocused to produce synthetic nitrates for use in explosives. These synthetic nitrates were necessary because the Allied blockade had effectively ended German access to naturally occurring nitrates that would normally be used in the manufacture of explosives. A spinoff application of energized German chemical industry's support to the Kaiser was an exploration into the use of noxious gases on the battlefield. This whole segment of the war provides an ironic commentary and would lend support to the concept of the "Law of Unintended Effects".

63. Wool, 15. Wool's work focuses on the demographics of the American military experience and makes extremely interesting reading out of what could be a very dry subject. His strength is in his approach, a continual focus on the future--what the military's needs will be in terms of skills versus the projections of the demographic pool available from which to draw those needs, in competition with the civil sector's needs for the same or similar skills. Using this approach, current US policy for the exploitation of technology as a combat multiplier could be assessed to be at significant risk.

64. Taylor, 17.

65. Dupuy, Johnson, and Bongard, 300.

66. Robert O'Neill, "Doctrine and Training in the German Army 1919-1939" in Theory and Practice of War, ed. Michael Howard, (Bloomington: Indiana University Press, 1975), 150.

67. Gordon Sullivan and James Dubik, "Land Warfare in the 21st Century," Military Review Volume 73, Number 9 (September 1993): 24.

68. John English, On Infantry (New York: Praeger Publishers, 1984), 121. The belief in the value of technology as a key element of military power remains a tenet of US policy.

69. A. J. Bacevich, The Pentomic Era (Washington, D.C.: National Defense University Press, 1986), 10.

70. van Creveld, Technology and War, 225.

71. Wool, 29.

72. James Hewes, From Root to McNamara: Army Organization and Administration 1900-1963 (Washington, D.C.: Department of the Army, Center of Military History, 1975), 157.

73. Stephen Rosen, Winning the Next War (Ithaca, NY: Cornell University Press, 1991), 50.

74. Glenn Bailey, "Military Technology and Military Organizational Structure" (MA Thesis, Department of Sociology, University of Texas at El Paso, May 1974), 1-9.

75. Wool, 39.

76. Bacevich, 110.

77. Bacevich, 114.

78. Chuck Hansen, U.S. Nuclear Weapons (Arlington, TX: Aerofax, 1988), 216. The tragic end of this physicist was graphically retained on film. Since he incurred his fatal radiation dosage at one of the premier nuclear research facilities of the time (Los Alamos), his scientific colleagues immediately grasped the opportunity to note and record the effects of a documented case of radiation poisoning. The film was required viewing for certain DOD students during a phase of training in radiological hazards.

79. U.S. Army, FM 5-103, Survivability (Washington, D.C.: Department of the Army, June 1985), 3-6.

80. LTG John E. Miller as cited by Thomas Thompson et al, "Battle Staff Training and Synchronization in Light Infantry Battalions" (US Army Research Institute, Alexandria, VA, December

1991. While Deputy Commandant at CGSC, LTG Miller made this statement as a part of his opening remarks to a TCDC class.

81. Ernest Dale and Lyndall Urwick, Staff in Organization (New York: McGraw-Hill, 1960), 60.

82. Wojdakowski, 45.

83. Rocco Carzo and John Yanouzas, Formal Organization: A Systems Approach (Homewood, IL: Dorsey Press, 1967), 40.

84. Kurt Lang, "Technology and Career Management in the Military Establishment" in The New Military, ed. Morris Janowitz, (New York: Russell Sage Foundation, 1969), 45. Concerns about uncertainty and instability are not new!

85. van Creveld, Technology and War, 315.

86. Frederick Timmerman, "Of Command and Control," Army volume 35, number 5 (May 1985), 57.

87. Daniel Bolger, "Command and Control," Military Review volume 70, number 7 (July 1990), 69.

88. Timothy McMahon, "The Key to Success," Military Review, volume 65, number 11 (November, 1985), 44.

89. McMahon, 43.

90. Draft FM 101-5, 2-9.

91. Crain, 59.

92. US Army, Command and General Staff College, "FM 101-5 Command and Control for Commanders and Staff," Final Draft, (FT Leavenworth, KS: US Army Command and General Staff College, July 1993), iv.

93. Jack Burkett, "Command and Control White Paper," First Draft, (FT Leavenworth, KS: BDM Federal, 22 March 1993), 1.

94. John Cushman, "AirLand Battle Mastery and Command and Control Systems for the Multinational Field Commander" in Tactical C3 for the Ground Forces, ed. James Rockwell (Washington, D.C.: AFCEA International Press, 1986), 9.

95. Bernard Pieczynski, "Problems in US Military Professionalism," (PhD Dissertation, Southern University of New York, 1985), 219.

96. Dale and Urwick, 83.

97. Carzo and Yanouzas, 50.
98. Chris Bellamy, The Evolution of Modern Land Warfare (New York: Routledge, 1990), 40.
99. Bellamy, Evolution of Land Warfare, 13.
100. Dupuy, A Genius for War, 24.
101. Jerry McElwee, "A First Cut at Doctrine for Automation of Division Command and Control," (SAMS Monograph, US Army Command and General Staff College, 2 Dec 1985), 4.
102. Gordon Sullivan and James Dubik, "Land Warfare in the 21st Century," Military Review, volume 73, number 9 (September 1993), 22.
103. Stephen Bankes, "Future Military Applications of Knowledge Based Engineering," (Santa Monica, CA: RAND Corporation, July 1985), 8.
104. Bankes, 7.
105. Stuart Johnson and Alexander Levis, Science of Command and Control. Part II: Coping with Uncertainty (Washington, D.C., AFCEA Press, 1989), vi.
106. Lang, 39.
107. Sullivan and Dubik, 22.
108. Jeffery Kohler, "Peace-Enforcement: Mission, Strategy, and Doctrine," (SAMS monograph, US Army Command and General Staff College, Academic Year 92-93), 1.
109. FM 100-5, 1-4.
110. Kohler, 20.
111. Curt Hoover, "CALL Newsletter: Strategic Deployment and Force Projection," Initial Draft, (FT Leavenworth, KS: Center for Army Lessons Learned, 20 Apr 93), 40.
112. Hoover, 86.
113. Hoover, 86.
114. Hoover, 37.
115. Hoover, 38.

116. "Getting to the Desert," CALL Newsletter 90-11 (December 1990), 7.

117. John Fishel, Liberation, Occupation and Rescue: War Termination and Desert Storm (Carlisle Barracks, PA: Strategic Studies Institute, August 31, 1992), 1.

118. Fishel, 1.

119. Richard Shultz, In the Aftermath of War (Maxwell Air Force Base, AL: Air University Press, August 1993), 67.

120. Shultz, 17.

121. Richard Stewart, Staff Operations, X Corps in Korea, December 1950 (FT Leavenworth, KS: Combat Studies Institute, 1991), 50.

122. Shultz, 20.

123. Stewart, 49.

124. Taylor, 35.

125. CALL Newsletter # 93-x, 2.

126. CALL Bulletin 2-86 (FT Leavenworth, KS: Center for Army Lessons Learned, November 1986), 17.

127. Experiences in Division Command, 1988 (Carlisle Barracks, PA: US Army Military History Institute, December 1988), 31.

128. CALL Bulletin 2-86, 17.

129. Taylor, 39.

130. Benjamin Cooling and John Hixson, "Lessons of Allied Interoperability: Portent for the Future?," Military Review volume 59, number 6 (June 1979), 44.

131. Burkett, 60.

132. Frederick Franks and Alan Carver, "Building a NATO Corps," Military Review volume 71, number 7 (July 1991), 32-33.

133. Wolfgang Malecha, "Integrated Staffs," NATO's Sixteen Nations volume 34, number 6 (October 1989), 28.

134. Taylor, 38.

135. Taylor, 39.

136. Jack Burkett, "Command and Control: the Key to Winning," Military Review volume 70, number 7 (July 1990), 65.

137. Taylor, 53.

138. Experiences in Division Command, 1988, 21.

139. Taylor, 26.

140. Memorandum, Combined Arms Training Activity to Commanding General TRADOC, SUBJECT: Skills from Operations JUST CAUSE and DESERT STORM, 20 Aug 93, US Army Combined Arms Command, FT Leavenworth, KS, second page (unnumbered). Although technically cited as a CATA document, this memorandum actually just serves as a vehicle to transmit the results of a CALL effort (CALL is a subordinate element of CATA). CALL should clearly receive acknowledgment for the actual contents, and the CATA memorandum itself identifies this work as CALL's.

141. CALL Bulletin 90-4, (FT Leavenworth KS: Center for Army Lessons Learned, May 90), 13.

142. Jomini, Antoine as cited in Hittle, James D., The Military Staff (Harrisburg: The Stackpole Company, 1961), preface.

143. Shultz, 67.

144. Johnson and Levis, vi.

145. van Creveld, Command in War, 231.

BIBLIOGRAPHY

Books

- Addington, Larry. The Patterns of War Since the Eighteenth Century. Bloomington: Indiana University Press, 1984.
- Allard, C. Kenneth. Command, Control, and the Common Defense. New Haven: Yale University Press, 1990.
- Bacevich, A. J. The Pentomic Era. Washington, D.C.: National Defense University Press, 1986.
- Bellamy, Chris. The Evolution of Modern Land Warfare. New York: Routledge, 1990.
- Bellamy, Chris. The Future of Land Warfare. New York: Saint Martin's Press, 1987.
- Brown, Alvin. The Armor of Organization. New York: Hibbert Printing, 1953.
- Carzo, Rocco and Yanouzas, John N. Formal Organization: A Systems Approach. Homewood, IL: Richard D. Irwin Inc. and the Dorsey Press, 1967.
- Chandler, David G. The Campaigns of Napoleon. New York: Macmillan, 1966.
- Craig, Gordon A. "Command and Staff Problems in the Austrian Army." In Theory and Practice of War. Edited by Michael Howard. Bloomington: Indiana University Press, 1975.
- Dale, Ernest, and Lyndall Urwick. Staff in Organization. New York: McGraw-Hill, 1960.
- De Greene, Kenyon. The Adaptive Organization. New York: John Wiley and Sons, 1982.
- Dupuy, Trevor. A Genius for War: The German Army and General Staff 1807-1945. Englewood Cliffs, NJ: Prentice-Hall, 1977.
- Dupuy, Trevor N., Curt Johnson and David Bongard. The Harper Encyclopedia of Military Biography. New York: Harper Collins, 1992.
- English, John A. On Infantry. New York: Praeger Publishers, 1984.

- Goerlitz, Walter. History of the German General Staff, 1637-1945. Translated by Brian Battershaw, New York: Frederick Praeger, 1967.
- Hagerman, Edward. The American Civil War and the Origins of Modern Warfare. Bloomington: Indiana University Press, 1988.
- Hamilton, Ian. The Soul and Body of an Army. Aldershot, England: Gregg Revivals, 1991.
- Hansen, Chuck. US Nuclear Weapons. Arlington, TX: Aerofax, 1988.
- Hittle, James D. The Military Staff: Its History and Development. Westport, CT: Greenwood Press, 1961.
- Howard, Michael, ed. The Theory and Practice of War. Bloomington, Indiana: Indiana University Press, 1975.
- Janowitz, Morris, editor. The New Military--Changing Patterns of Organization. New York: Russell Sage Foundation, 1969.
- Johnson, Stuart E. and Levis, Alexander H, editors. Science of Command and Control: Coping with Uncertainty. Washington, D.C.: AFCEA International Press, 1988.
- Johnson, Stuart E. and Levis, Alexander H, editors. Science of Command and Control: Part II--Coping with Complexity. Fairfax, VA: AFCEA Press, 1989.
- Lawler, Edward E. and Rhode, John Grant. Information and Control in Organizations. Pacific Palisades, CA: Goodyear Publishing, 1976.
- Menning, Bruce W. Bullets Before Bayonets. Bloomington: Indiana University Press, 1992.
- Mooney, James D. and Reiley, Alan C. The Principles of Organization. New York: Harper and Brothers, 1939.
- Posen, Barry R. The Sources of Military Doctrine. Ithaca, New York: Cornell University Press, 1984.
- Quimby, Robert S. The Background of Napoleonic Warfare: the Theory of Military Tactics in the Eighteenth Century. New York: AMS Press, 1968.

- Rockwell, James M., editor. Tactical C3 for the Ground Forces. Washington, D.C.: AFCEA International Press, 1986.
- Ropp, Theodore. War in the Modern World. New York: Macmillan, 1962.
- Rosen, Stephen. Winning the Next War. Ithaca, NY: Cornell University Press 1991.
- Simpkin, Richard. Race to the Swift. London: Brassey's Defence Publishers, 1985.
- Spaulding, Oliver L. The United States Army in War and Peace. New York: G. P. Putnam's Sons, 1937.
- Strachan, Hew. European Armies and the Conduct of War. London: George Allen and Unwin, 1983.
- Svechin, Aleksander A. Strategy. Edited by Kent D. Lee, Minneapolis: East View Publications, 1992.
- Van Creveld, Martin L. Command in War. Cambridge, Massachusetts: Harvard University Press, 1985.
- Van Creveld, Martin L. Technology and War. New York: The Free Press, 1991.
- Weigley, Russell F. The American Way of War. Bloomington: Indiana University Press, 1977.
- Weigley, Russell F. History of the United States Army. New York: Macmillan Publishing Company, 1967.
- Wool, H. The Military Specialist. Baltimore: Johns Hopkins Press, 1968.

Government Documents

- Fishel, John T. Liberation, Occupation and Rescue: War Termination and Desert Storm. Carlisle Barracks PA: Strategic Studies Institute, August 1992.
- Griffin, Gary B. The Directed Telescope: A Traditional Element of Effective Command. Fort Leavenworth KS: Combat Studies Institute, 1991.
- Hewes, James E. From Root to McNamara: Army Organization and Administration, 1900-1963. Washington D.C.: Center of Military History, 1975.

- Shultz, Richard H. In the Aftermath of War. Maxwell AFB AL: Air University Press, August 1993.
- Stewart, Richard W. Staff Operations: The X Corps in Korea, December 1950. FT Leavenworth KS, Combat Studies Institute, 1991.
- Upton, Emory. The Military Policy of the United States. Washington, D.C.: U.S. Government Printing Office, 1907.
- US Army. Experiences in Division Command. Carlisle Barracks PA: US Army Military History Institute, 1988.
- US Army. Field Manual 5-103 Survivability. Washington D.C.: Headquarters, Department of the Army, June 1985.
- US Army. Field Manual 100-5 Operations. Washington D.C.: Headquarters, Department of the Army, June 1993.
- US Army. Field Manual 101-5 Staff Organizations and Operations. Washington D.C.: Headquarters, Department of the Army, 25 May 1984.
- US Army. Field Manual 101-5 Command and Control for Commanders and Staff (Draft). Washington D.C.: Headquarters, Department of the Army, July 1993.
- US Army. CALL Bulletin. FT Leavenworth KS, (July 1986): No. 1-86.
- US Army. CALL Bulletin. FT Leavenworth KS, (November 1986): No. 2-86.
- US Army. CALL Bulletin. FT Leavenworth KS, (April 1987): No. 1-87.
- US Army. CALL Bulletin. FT Leavenworth KS, (May 1990): No. 90-4.
- US Army. CALL Bulletin. FT Leavenworth KS, (October 1990): No. 90-9.
- US Army. CALL Newsletter. FT Leavenworth KS, (December 1990): No. 90-11.
- US Army. CALL Newsletter. FT Leavenworth KS, (December 1992): No. 92-6.

US Army. CALL Newsletter (Initial Draft). FT
Leavenworth KS, (20 April 1993): No. 93-x.

US Army. NTC Lessons Learned. FT Leavenworth KS:
Combined Arms Training Activity, 1 September 1986.

US Army. NTC Lessons Learned. FT Leavenworth KS:
Combined Arms Training Activity, 27 February 1987.

Periodicals and Articles

Bolger, M. "Command or Control." Military Review,
(July 1990): Vol. 70, No. 7.

Burkett, Jack. "Command and Control is the Key to
Winning." Military Review, (July 1990): Vol. 70,
No. 7.

Cooling and Hixson. "Lessons of Allied
Interoperability: A Portent for the Future?"
Military Review, (June 1979): Vol. 59.

Franks, Frederick and Carver, Alan T. "Building a NATO
Corps." Military Review, (July 1991): Vol. 71,
No. 7.

Malecha, W. "Integrated Staffs: A NATO Success Story."
NATO's Sixteen Nations, (Oct 1989): Vol. 34.

Mather, Walter E. "A Bilateral Staff." Infantry,
(January/February 1982): Vol. 72, No. 1.

McMahon, Timothy. "The Key to Success: Developing a C2
Philosophy." Military Review, (November 1985):
Vol. 65, No. 11.

Timmerman, Frederick W. "Of Command and Control."
Army, (May 1985): Vol. 35, No. 5.

Sullivan, Gordon and Dubik, James. "Land Warfare in
the 21st Century." Military Review, (September
1993): Vol. 73, No. 9.

Wojdakowski, Walter. "Staff Philosophy." Military
Review, (November 1988): Vol. 68.

Zinni, Anthony A. and Ellertson, Jack W. "Scrapping
the Napoleonic Staff Model." Military Review,
(July 1992): Vol. 72, No. 7.

Unpublished Papers

- Bailey, Glenn. "Military Technology and Military Organizational Structure." MA Thesis, Department of Sociology. University of Texas at El Paso, May 1974.
- Bankes, Steven C. "Future Military Applications for Knowledge Engineering." RAND. Santa Monica CA, July 1985.
- Burkett, Jack. "Command and Control White Paper (Initial Draft)." BDM Federal. FT Leavenworth KS, 22 March 1993.
- Crain, William. "Battle Staff Operation: Synchronization of Planning at Battalion and Brigade Level." Thesis, US Army Command and General Staff College. FT Leavenworth KS, 1989.
- Crumley, L. M. and Sherman, M. B. "Review of Command and Control Models and Theory." Army Research Institute. Alexandria VA, Sep 1990.
- Kahan, James et al. "Understanding Commanders' Information Needs." RAND. Santa Monica CA, June 1989.
- Kohler, Jeffrey. "Peace Enforcement: Mission, Strategy, and Doctrine." School of Advanced Military Studies. Monograph, US Army Command and General Staff College, Academic Year 1992-1993.
- McElwee, Jerry. "A First Cut at Doctrine for Automation of Division Command and Control." School of Advanced Military Studies. Monograph, US Army Command and General Staff College, 2 December 1985.
- Miewald, Robert D. "The Stability of Military Managerial Doctrine: The United States Army, 1866-1941." Department of Political Science. Thesis, University of Colorado, 1966.
- Olmstead, J. A. "Battle Staff Integration." Institute for Defense Analyses, Alexandria, VA, Feb 1992.
- Pieczynski, Bernard. "Problems in US Military Professionalism, 1945-1950." Doctoral Dissertation, State University of New York at Buffalo, 1985.

Schifferle, Peter J. "The Prussian and American General Staffs: An Analysis of Cross-Cultural Imitation, Innovation and Adaptation." Department of History. Thesis, University of North Carolina, 1981.

Schillare, Q.W. "Force Generation in an Immature Contingency Theater." School of Advanced Military Studies. Monograph, US Army Command and General Staff College, Second Term, Academic Year 1989-1990.

Taylor, Clarence E. "US Army Staffs: Are They Broken?" School of Advanced Military Studies. Monograph, US Army Command and General Staff College, First Term, Academic Year 1991-1992.

Thompson, M.R. "Is Organization the Synchronization Problem? Battle Staff Organizations of the Heavy Task Force." School of Advanced Military Studies. Monograph, US Army Command and General Staff College, First Term, Academic Year 1989-1990.

Tiberi, P. "Force Projection: Seeds for a new Doctrine." Army War College. Carlisle Barracks, PA, 20 May 1991.

Tucker, Christopher. "US Army Command and Control at the Operational Level." School of Advanced Military Studies. Monograph, US Army Command and General Staff College, Academic Year 1991-1992.

Tucker, Terry. "Peacekeeping in Europe: How Can The United Nations Do It?" School of Advanced Military Studies. Monograph, US Army Command and General Staff College, Academic Year 1992-1993.

Wildenberg, John T. "Command and Control Architecture of the Future." Army War College. Carlisle Barracks PA, March 1987.

Letters

Frazar, Joe N. Memorandum to Commanding General, TRADOC. SUBJECT: Skills from Operations JUST CAUSE and DESERT STORM. 20 Aug 1993.